

What Is Claimed Is:

1 1. A method for enabling a user interface manager to modify a scene
2 graph for an application, comprising:
3 receiving the scene graph for the application, wherein the scene graph
4 defines visual attributes for a user interface associated with application;
5 using the scene graph to render a visual output for the user interface;
6 displaying the visual output for the user interface to a user of the
7 application; and
8 modifying the scene graph through the user interface manager, whereby
9 the user interface manager can produce visual effects for the user interface in
10 addition to visual effects produced by the application.

1 2. The method of claim 1, wherein receiving the scene graph for the
2 application involves:
3 allowing the application to construct the scene graph; and
4 receiving the scene graph from the application.

1 3. The method of claim 1,
2 wherein receiving the scene graph for the application involves receiving
3 multiple scene graphs for multiple applications; and
4 wherein displaying the visual output involves displaying visual output for
5 multiple applications in the same display.

1 4. The method of claim 3, wherein displaying the visual output
2 involves ensuring that there is no interference between visual output from
3 different user interfaces.

1 5. The method of claim 3, wherein the user interface manager
2 maintains the multiple scene graphs in separate data structures.

1 6. The method of claim 3, wherein the user interface manager
2 combines the multiple scene graphs into a single master scene graph that
3 represents an entire scene to be displayed.

1 7. The method of claim 1, further comprising:
2 intercepting a user input event for the user interface at the user interface
3 manager before the user input event is forwarded to the application; and
4 performing an associated action.

1 8. The method of claim 7, wherein after intercepting the user input
2 event, the user interface manager:
3 consumes the user input event;
4 forwards the user input event to the application; or
5 modifies the user input event before forwarding the user input event to the
6 application.

1 9. The method of claim 7, wherein performing the associated action
2 involves modifying the scene graph to produce visual effects for the user
3 interface.

1 10. The method of claim 1, wherein modifying the scene graph through
2 the user interface manager involves:

3 cutting or copying a portion of a first scene graph associated with a first
4 application; and
5 pasting the portion to a second scene graph associated with a second
6 application.

1 11. The method of claim 1, wherein modifying the scene graph through
2 the user interface manager involves:
3 cutting or copying a portion of the scene graph; and
4 converting the portion into an independent branch graph that the user
5 interface manager interacts with directly.

1 12. The method of claim 1, wherein modifying the scene graph through
2 the user interface manager involves adding a lower-level branch graph to the
3 scene graph to produce a unified scene graph.

1 13. The method of claim 12, wherein the lower-level branch graph is
2 associated with a second application.

1 14. The method of claim 13, wherein adding the lower-level branch
2 graph to the scene graph additionally involves providing a security mechanism,
3 which can be used to restrict the application from accessing the lower-level
4 branch graph associated with the second application.

1 15. The method of claim 13, wherein adding the lower-level branch
2 graph to the scene graph additionally involves providing a security mechanism,
3 which can be used to restrict the second application from accessing higher-level
4 portions of the scene graph associated with the application.

1 16. A computer-readable storage medium storing instructions that
2 when executed by a computer cause the computer to perform a method for
3 enabling a user interface manager to modify a scene graph for an application, the
4 method comprising:
5 receiving the scene graph for the application, wherein the scene graph
6 defines visual attributes for a user interface associated with application;
7 using the scene graph to render a visual output for the user interface;
8 displaying the visual output for the user interface to a user of the
9 application; and
10 modifying the scene graph through the user interface manager, whereby
11 the user interface manager can produce visual effects for the user interface in
12 addition to visual effects produced by the application.

1 17. The computer-readable storage medium of claim 16, wherein
2 receiving the scene graph for the application involves:
3 allowing the application to construct the scene graph; and
4 receiving the scene graph from the application.

1 18. The computer-readable storage medium of claim 16,
2 wherein receiving the scene graph for the application involves receiving
3 multiple scene graphs for multiple applications; and
4 wherein displaying the visual output involves displaying visual output for
5 multiple applications in the same display.

1 19. The computer-readable storage medium of claim 18, wherein
2 displaying the visual output involves ensuring that there is no interference
3 between visual output from different user interfaces.

1 20. The computer-readable storage medium of claim 18, wherein the
2 user interface manager maintains the multiple scene graphs in separate data
3 structures.

1 21. The computer-readable storage medium of claim 18, wherein the
2 user interface manager combines the multiple scene graphs into a single master
3 scene graph that represents an entire scene to be displayed.

1 22. The computer-readable storage medium of claim 16, wherein the
2 method further comprises:
3 intercepting a user input event for the user interface at the user interface
4 manager before the user input event is forwarded to the application; and
5 performing an associated action.

1 23. The computer-readable storage medium of claim 22, wherein after
2 intercepting the user input event, the user interface manager:
3 consumes the user input event;
4 forwards the user input event to the application; or
5 modifies the user input event before forwarding the user input event to the
6 application.

1 24. The computer-readable storage medium of claim 22, wherein
2 performing the associated action involves modifying the scene graph to produce
3 visual effects for the user interface.

1 25. The computer-readable storage medium of claim 16, wherein
2 modifying the scene graph through the user interface manager involves:
3 cutting or copying a portion of a first scene graph associated with a first
4 application; and
5 pasting the portion to a second scene graph associated with a second
6 application.

1 26. The computer-readable storage medium of claim 16, wherein
2 modifying the scene graph through the user interface manager involves:
3 cutting or copying a portion of the scene graph; and
4 converting the portion into an independent branch graph that the user
5 interface manager interacts with directly.

1 27. The computer-readable storage medium of claim 16, wherein
2 modifying the scene graph through the user interface manager involves adding a
3 lower-level branch graph to the scene graph to produce a unified scene graph.

1 28. The computer-readable storage medium of claim 27, wherein the
2 lower-level branch graph is associated with a second application.

1 29. The computer-readable storage medium of claim 28, wherein
2 adding the lower-level branch graph to the scene graph additionally involves

3 providing a security mechanism, which can be used to restrict the application from
4 accessing the lower-level branch graph associated with the second application.

1 30. The computer-readable storage medium of claim 28, wherein
2 adding the lower-level branch graph to the scene graph additionally involves
3 providing a security mechanism, which can be used to restrict the second
4 application from accessing higher-level portions of the scene graph associated
5 with the application.

1 31. An apparatus that enables a user interface manager to modify a
2 scene graph for an application, comprising:
3 a receiving mechanism configured to receive the scene graph for the
4 application, wherein the scene graph defines visual attributes for a user interface
5 associated with application;
6 a rendering mechanism configured to use the scene graph to render a
7 visual output for the user interface;
8 a display mechanism configured to display the visual output for the user
9 interface to a user of the application; and
10 a user interface manager configured to modify the scene graph, whereby
11 the user interface manager can produce visual effects for the user interface in
12 addition to visual effects produced by the application.

1 32. A means for enabling a user interface manager to modify a scene
2 graph for an application, comprising:
3 a receiving means for receiving the scene graph for the application,
4 wherein the scene graph defines visual attributes for a user interface associated
5 with application;

6 a rendering means for using the scene graph to render a visual output for
7 the user interface;
8 a display means for displaying the visual output for the user interface to a
9 user of the application; and
10 a user interface management means configured to modify the scene graph,
11 whereby the user interface management means can produce visual effects for the
12 user interface in addition to visual effects produced by the application.